

INFORMES RESUMEN

Cadena de valor con sarmiento para Red de Calor en Vilafranca del Penedés



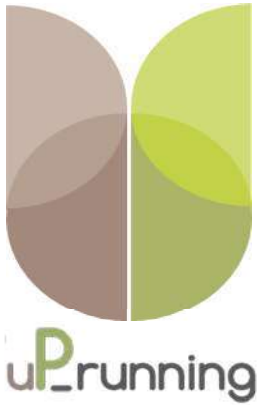
Fecha: 2019

Fuente: proyecto uP_running, entregable D6.3 e informe monográfico #3 de casos de éxito

Origen de datos en: www.up_running.eu

Contenido:

- Ficha resumen de caso de éxito (1 pag – Lenguaje: Español)
- Informe resumen del caso de éxito: (12 pag – lenguaje: Inglés)



CALOR PARA DIFERENTES MUNICIPIOS (DISTRICT HEATING) A PARTIR DE PODA DE VIÑEDO



Nombre: Ayuntamiento de Vilafranca del Penedés / Vineyards4Heat
Localización: Vilafranca del Penedés, España
Biomasa procesada: 225 toneladas por año de poda de viña (triturada)
Producto principal: Calor (bodegas locales y sistema de calor para diferentes edificios)
Radio de abastecimiento: 15 km
Inversión total: 600,000 €
Año de inicio: 2015
Reducción emisiones CO₂: 125 tCO_{2eq} por año



Descripción

El municipio de Vilafranca del Penedés (España) inició el proyecto LIFE + Vineyards4heat (VinyesxCalor) para el aprovechamiento energético de la poda de viñedos, una fuente abundante de biomasa en la comarca de Penedés. La biomasa fue inicialmente proporcionada por alrededor de 50 agricultores, agrupados bajo la asociación COVIDES. Aunque al principio se utilizaron pequeñas cantidades en una caldera nueva instalada en la bodega Cavas Vilarnau, el consumo se ha asegurado gracias a la iniciativa del Ayuntamiento, que ha incorporado una nueva competencia de servicios de calefacción a la Empresa municipal de abastecimiento de agua de Vilafranca. (EMAVSA). EMAVSA opera el sistema de calefacción del barrio "La Girada", que actualmente presta calefacción y agua caliente a 4 edificios públicos. La calefacción se está ampliando constantemente a otros edificios. La logística de biomasa fue inicialmente resuelta por una cooperativa social local que ofrecía servicios de jardinería y agricultura llamados NOUVERD. Aunque llevaban a cabo una cuidadosa planificación de la logística, los costes involucrados eran altos, y no todos los agricultores estaban dispuestos a pagar una pequeña tarifa por la recogida de la poda. La cooperativa local La Granada se dio cuenta de que el retiro de la poda era un servicio beneficioso para sus asociados y para la solidez de los viñedos, y asumió el cargo a partir de 2018

Operaciones logísticas

Las podas se dejan en el campo durante un período de alrededor de 30 días después de la recogida, con el fin de reducir su contenido de humedad hasta un 30% (base húmeda). La recolección está organizada por NOU VERD, que realiza el triturado de las ramas con una Cobra Collina B1400 de la marca PERUZZO. Una vez que el contenedor está lleno, el combustible triturado se descarga en un remolque estacionado en el lado del campo y luego se transporta al punto de almacenamiento. El almacenamiento, gestionado por la empresa de recolección, permite disminuir el contenido de humedad a menos del 20% en alrededor de 1,5 meses.



ENLACES CLAVE

Página web proyecto:
<http://vineyards4heat.eu/>
 Informe principal detallado:
<http://www.up-running.eu/project-materials/>
 Observatorio:
<http://www.up-running-observatory.eu>

Puntos principales /factores de éxito

- El papel del Ayuntamiento como promotor y la participación de los actores de la cadena de valor a través de una iniciativa Life+ fue crucial para iniciar la iniciativa.
- El diálogo y la comprensión mutua para organizar los roles en la nueva cadena de valor.
- El Ayuntamiento ha desempeñado un papel importante al establecer un primer consumo en la instalación de calefacción del distrito que se está ampliando año tras año.
- El Ayuntamiento ha establecido una nueva competencia en manos de la empresa pública de agua para poder ofrecer también un nuevo servicio de distribución de calor.
- Una bodega de referencia (Bodegas Torres) ya estaba utilizando la poda como energía en sus instalaciones desde 2012.
- Ya existían empresas de servicios con capacidad para iniciar nuevas cadenas de biomasa de podas.
- Una selección adecuada de la maquinaria de recolección era esencial para garantizar la calidad del producto y la viabilidad económica.
- La baja productividad de la biomasa (<1t/ha) y la logística hicieron que los costos de la poda sean altos. Gracias a la experiencia, una cooperativa local asumió el rol de proveedor que internaliza parte de los costes.



D6.3: Flagship success cases update v1 Annex II: Vineyards4heat flagship report

uP_running

Take-off for sustainable supply of woody biomass from agrarian pruning and plantation removal

Grant agreement: 691748

From April 2016 to June 2019


Prepared by: CIRCE

Date: 20.10.2017

This project has received funding from the European Union's Horizon 2020 research and innovation programme under Grant Agreement No 691748.



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Introduction

The Vineyards Virtuous Cycle (VVC) is an initiative promoted by the municipality of Vilafranca del Penedés (Spain) as a political commitment to set an efficient low carbon economy through the use of an abundant source of biomass in the area, currently underused: prunings from vineyards.

It is considered an uP_running flagship success case since this initiative has created a demand for pruning in the area, boosting a new activity in the local agrarian sector. For this purpose, multiple local public and private actors have been involved to create a new and sustainable value chain guaranteeing the profitability of the energy production from vineyard prunings: farmers, a harvesting service company, an energy service company, several consumers and the municipality.



Figure 1. The logo of Vineyards4heat project co-financed by Life Programme and coordinated by the municipality of Vilafranca del Penedés.

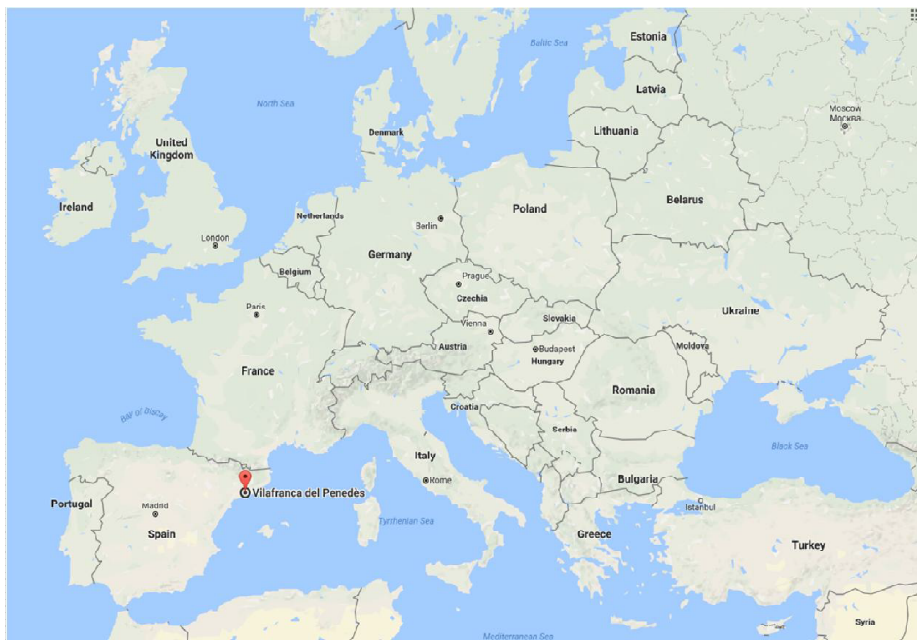


Figure 2. Location of Vilafranca del Penedés.

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Table 1. The Vineyards4heat flagship case at a glance.

Vineyards4heat at a glance	
Location	Vilafranca del Penedés, Spain
Type of APPR involved	Prunings
Crop species used	Vineyards (in espalier)
Year of initiation	2015
Volume of APPR mobilized (tons per year)	225 t/y on average during the project although the potential can be up to 30,000 t/y in the area
Surface area with permanent crops mobilized	375 ha in total (several scattered fields) (25,000 ha of vineyards in Penedés county)
Maximum radius of operation	< 15 km
Main product	Heat production from APPR
CO ₂ emissions avoided ¹	125 t saved in 2016
Number of jobs created	4 (permanent)
Total level of investment	0.6 M€

Business model

The business model involved by the VCC initiative is as follows:

The biomass is provided by around 50 farmers, grouped under the association COVIDES (composed by more than 600 local farmers who represent around 2,200 ha of vineyards).

Current consumers of vineyard prunings are: Cavas Vilarnau winery and the district heating of “La Girada”. Concerning the winery, it is part of INNOVI cluster of Catalonian wine industry, a non-profit organization registered as an Innovative Business Association (AEI) and it currently uses part of the APPR biomass to generate thermal energy in its facilities. Other local wineries are expected to follow its example. With respect to the district heating, it has been built to provide heating and hot water to four public buildings (one more is expected to be connected to the network in the near future).

Two companies link the interests of resource providers (at the top of the supply chain) and consumers (at the bottom), making the whole value chain economically feasible, due to a careful planning of the logistics:

- A gardening service social cooperative (NOU VERD), which carries out the operations of biomass harvesting, pre-treatment, transport, storage and final transport to the consumers.
- The Municipal Water Company of Vilafranca (EMAVSA), which acts as an energy service company organising, together with NOU VERD, the whole value chain and managing the operation of the combustion facility in the district heating.

¹ The calculation of CO₂ emissions saved was done by the Vineyards4heat project in 2016.

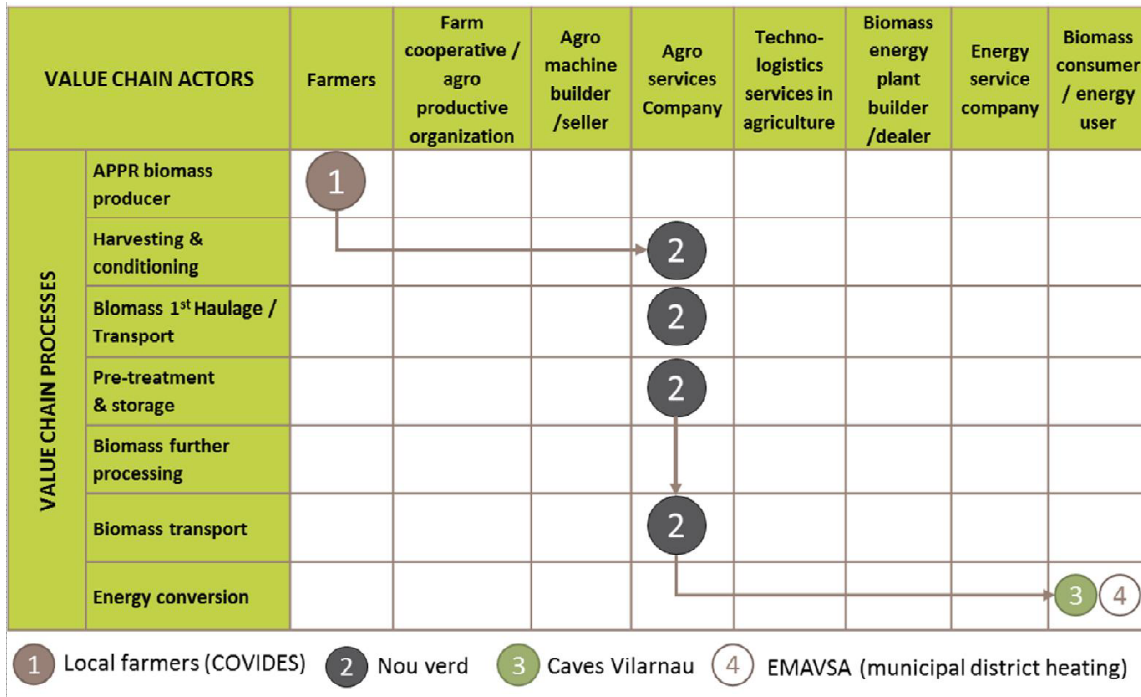


Figure 3. Role of actors involved in the Vineyard4heat case.

Table 2. Benefits for the actors participating in the Vineyards4heat case.

Value Chain Actor	Tangible benefits	Intangible benefits
Farmers	Save time and money in pruning management	Avoid risks of fires and diseases Avoid pollution due to open-field burning of prunings
Social Cooperative (NOU VERD)	Get economic margin Diversify activities	
End user (Cavas Vilarnau)	Lower energy cost	“Greener” image of business
End users (local authorities)	Lower energy cost Reduced municipal taxes	Improved air quality Promote successful utilization case of prunings Job creation

A total of 4 new permanent jobs have been created linked to the logistics operations for the resource.

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History / Reasons for initiating

Part of the motivation came from the subscription of the Municipality to the Covenant of Mayors for Climate & Energy ([EC initiative](#)) in which several Sustainable Energy Action Plans were promoted.

The rest of the motivation was triggered: (1) by the reality of the pruning residues management, which needed to be improved; (2) by the willingness to increase the competitiveness of the county economy; and (3) following the wine tourism local initiatives in the area, promoting sustainability and a zero km economy as a flag.

Availability, harvesting and logistics of APPR biomass

From the 90's until the present day, the cultivated lands in the Penedés area have undergone improvements and the plantation systems have been adapted in order to allow mechanised harvesting.

Currently the vineyards have been adapted to allow performing the pruning operations with an initial mechanical pre-pruning, followed by a manual pruning to remove the remaining shoots from its base. At the moment the initiative focuses on pruning residues from manual prunings.

The project has also evaluated the idea to use the material from the pre-pruning labours to increase the potential of resources to be collected, a prototype has been developed for this purpose and further improvements are needed to reach commercial state and acceptable economic feasibility. The most important concept of this prototype has been the building of a machinery that once pruned, cuts the branch and push the biomass to the container without touching the soil.

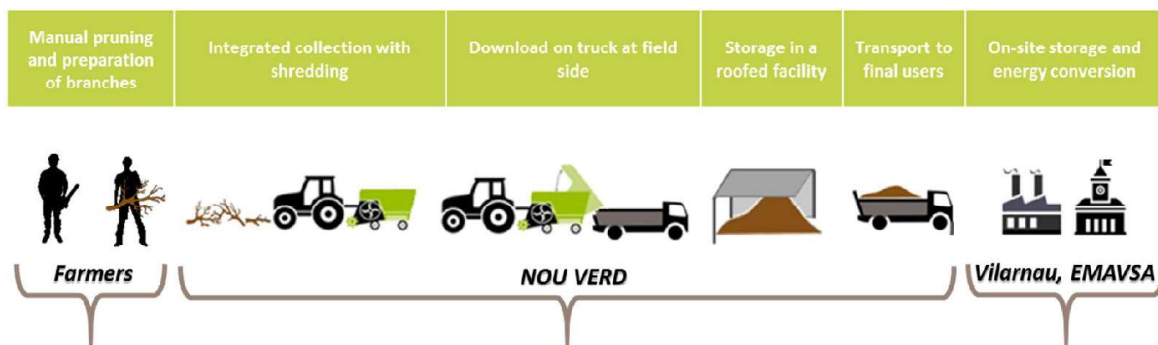



Figure 4: Logistics arrangements for the Vineyards4heat case.

Usually, the prunings are left for a period of around 30 days on the field before harvesting, in order to reduce their moisture content till 30 % (wet basis). The productivity measured during the project development is around 0.5 - 0.7 t/ha although it should be highlighted that the years of the project have been really dry and therefore it is expected that during regular conditions, the potential could rise up to 1 t/ha.

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The harvesting is then organized by the gardening service company NOU VERD. The machinery, a Cobra Collina B1400 from the company PERUZZO, consists of a shredder able to perform the pick-up and shredding of the branches. The material is conveyed into an integrated tilting bin. Once the bin is filled, it is able to discharge the material collected directly on agricultural trailers or small open-box trucks (see Figure 5). The prunings from 44-46 farmers, in a radius of less than 15 km, is gathered. The selection of farmers includes not only the distance to the storage point, but also the vineyard species since some of them are more productive and the surface easily available.

Once the bin is full, the hog fuel (not wood chips, but inhomogeneous shredded pieces of wood) is unloaded on a trailer (Figure 6) parked at the field side. Around 0.5 ha are harvested per hour with an approximate consumption of 7 l/h. With this chain, it is estimated that around 1 % of the potential material remains on the field.

The small trucks bring the material to the storage point, which gathers yearly around 1,000 m³ from November to June, in a roofed and paved area with piles of 100 m³ (see Figure 7). The distance between the storage point and the current consumers is less than 15 km. The storage, managed by the harvesting company, allows to decrease the moisture content to less than 20 % in around 1.5 months.

The costs per tonne of vineyard pruning wood (accumulated along the whole chain till the consumer) are around 70 €/t at 20 % moisture content (4.72 €/GJ), which enables a selling price competitive with the fossil fuels and other biomasses from forest sources supplied in the area.



Figure 5: Harvesting + pre-treatment process using the Cobra Collina B1400 (Source: Vineyards4heat).


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Figure 6: The Cobra Colina (PERUZZO) unloads vineyards pruning chips to a trailer (Source: CIRCE).



Figure 7: The roofed storage facility (Source: Vineyards4heat).

Soil management and agronomic practices

The perception from farmers is that soil sustainability issues are not influenced in a significant way by the use of this resource. A survey made by the cooperative of farmers involved in the project resulted in the fact that 97 % of the farmers involved would like to continue providing their prunings since they save time and money in managing this resource.

End use of APPR biomass

The pruning hog fuel is consumed at an average moisture content of 20 % on wet basis, an ash content of 6 % on dry basis, a low heating value of 14.8 MJ/kg and a particle size distribution classified as G50 (see Figure 8). The low density and irregular shape make the hog fuel required an adaptation of the boilers feeding system: the silo is designed to avoid bridges and the feeding screw

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is prepared for particles with longer size. Regarding the combustion system, the higher ash content and lower density compared to regular forest wood fuels, was taken into account in the selection of the system and in the operational parameters.



Figure 8: The inhomogeneous biomass (hog fuel) from vineyard prunings consumed at Vilafranca district heating (Source: CIRCE).

The boiler at Cavas Vilarnau (winery sited in Espiells, about 15 km distance from Vilafranca del Penedés) has an output power of 130 kW, consuming 75 t/year at 20% moisture on wet basis. The boiler is a Herz Firematic, which required a fine tuning and adapting the feeding system, ash discharge and air flows. This boiler has been prepared to be able to burn both, dry forestry woodchips and vineyards pruning, though switching from one to other fuels require the maintenance service to modify the boilers parameters. The boiler, together with the auxiliaries, was installed in a container besides the winery (see Figure 9). The winery has substituted totally the consumption of fossil fuels by APPR biomass. The heat is utilised for sterilising the bottles along the bottling line.

The district heating sited in Vilafranca del Penedes was built to supply the necessities of 4 public buildings (heating and hot water) placed in the quartier of La Girada. A Heizomat RHK-AK-500 boiler of 500 kW was installed. It is fully runs on vineyards pruning wood hog fuel. The saving in natural gas and electricity are up to 153 and 13 MWh, respectively, thanks to the use of APPR biomass.


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Figure 9: Container placed at Cavas Vilarnau to supply heat to the winery (source Vineyards4Heat).


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Figure 10: Sketch of the district heating fed with vineyard prunings (source Vineyards4Heat)

Success factors and obstacles

The main barriers that, according to the Vineyards4heat project experience, can stop or slow similar initiatives are:

- The low biomass potential of vineyard prunings (≤ 1 t/ha) can make difficult the economic feasibility of the chain.
- Farmers are not aware that APPR for energy is possible.

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- Initial reluctance of the technical staff that operates the boiler: hard work to find the optimal operation.

In that sense, the project provides the following keys to bear in mind:

- The area has an important concentration of vineyards (30,000 ha in a small radius).
- INNOVI cluster of Catalonian wine industry made research and market analysis, to be sure that there exists a real interest and demand for biomass vineyard pruning.
- The biomass demand was ensured by means of the new District heating unit in Vilafranca del Penedés.
- The city council and the wine makers performed an intense information campaign to promote social acceptance.
- In the area there were already service companies / persons with capacities to start new biomass chains on prunings (e.g. service company providing APPR wood to Bodegas Torres).
- Farmers were aware of the costs for management of the pruning (further work performed by COVIDES cooperative to their members).
- The twinning with the German town of Buhl, from where they got to know their initiatives in pruning harvest.
- Policy makers had in mind clear objectives on the utilisation of pruning or agrarian residues (Vilafranca del Penedés city councils was the catalyser and leader to promote the association and the new initiatives).
- The dialogue, understanding and alliance among diverse local key actors boosted the starting of pruning utilisation (private/public consortium to use pruning for heating in public schools).
- The modification of the statutes of the local water management public company, to be able to take care of providing not only pipe water service, but also energy services.
- An optimal planning of the logistic to satisfy the farmers demands, since their priority is to get rid of the pruning residues as soon as possible.
- The selection of the harvesting machinery is essential to ensure product quality and economic feasibility.
- An optimal placing of the storage point to be able to make the value chain feasible.
- The optimisation of the boiler operation and maintenance to be able to work satisfactorily with a fuel of lower density and higher ash content as compared to regular forest woodchips.

Lessons learnt

In some cases, the public institutions should be the ones triggering “non-conventional” initiatives, to assume the initial technical and economic risks associated. Once performed, this type of projects become the seed that triggers new ones in the area, promoting private entrepreneurship.

In the case of Vilafranca del Penedés, the implementation of a public entity in charge of managing the logistics and the consumption was the best solution to increase the participation of the

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population (farmers and consumers), providing both the continuation of the project and assuring the biomass supply.

Future prospective

With the material currently mobilised (around 50 farmers involved), the initiative has the capacity to supply the whole consumption for the two APPR biomass consumers (the winery and the district heating). Interest has grown from private companies in the area and new public buildings are planned to join the district heating.

The service company performing the pruning wood harvesting (NOU VERD) will continue optimising the prototype developed by the project to gather the pre-pruning material and testing the economic feasibility in the local conditions.

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